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IS 13747 (1993): Textile machinery - Hand-operated, single bed type, domestic knitting machines [TXD 14: Machinery for Fabric Manufacture]

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Indian Standard

TEXTILE MACHINERY — HAND-OPERATED, SINGLE BED TYPE, DOMESTIC KNITTING MACHINES — SPECIFICATION

UDC 677·055·47

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

August 1993

Price Group 3

Knitting Machinery Sectional Committee, TX 22

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Knitting Machinery Sectional Committee had been approved by the Textile Division Council.

In the formulation of this standard, assistance has been derived from JIS B 9091-1978 'Hand knitting machines' published by the Japanese Standards Association.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

TEXTILE MACHINERY — HAND-OPERATED, SINGLE BED TYPE, DOMESTIC KNITTING MACHINES — SPECIFICATION

1 SCOPE

1.1 This standard specifies the requirements of all types (manual, semiautomatic and cardomatic) of hand-operated single bed type knitting machines.

1.2 This machine is used for knitting following counts of 2 to 4 ply worsted yarns or their equivalent yarns:

a) Fine yarn 2 × 49·2 tex (2/18 worsted) or 2 × 55·4 tex (2/16 worsted).

b) Medium fine yarn 3 × 49·2 tex (3/18 worsted) or 3 × 55·4 tex (3/16 worsted).

c) Coarse yarn 4 × 49·2 tex (4/18 worsted).

Types of yarn which can easily be knitted on these machines are:

a) Wool

b) Synthetic

c) Cotton

2 REFERENCES

The standards listed in Annex A are necessary adjuncts to this standard.

3 TERMINOLOGY

3.1 Types of Knitting Machines

3.1.1 *Manual Type*

In the 'Manual Type' of knitting machine, the selection of needles for knitting tuck, slip, float stitch and other varieties of single jersey design is generally done by the selector plates operated by hand.

3.1.2 *Semiautomatic*

In 'Semiautomatic' machines, the selection of needles is done mechanically by an apparatus known as jacquard attachment (push button or other types) fitted at the back of the machine under the needles.

3.1.3 *Cardomatic*

In 'Cardomatic' machines, the pre-punched card chains, whereon the design is punched, are used. These are fitted along with the jacquard attachment of the machine and the selection of needles for various designs in different stitches/types of knittings are produced automatically on the machine by the manual traverse movement of the carriage. In cardomatic machines, the designs are produced at a great speed on the whole length and width of the garment or on any part where it is desired. The designing scope is also greater as compared to manual and semiautomatic machines.

3.2 Particulars of Knitting Machines

3.2.1 *Needle Pitch*

Distance in millimetres between centres of two adjacent needles.

3.2.2 *Groove*

Slot of bed where needle works for knitting.

3.2.3 *Working Width of Bed*

Distance between centres of two outermost working needles in millimetre.

3.2.4 *Gauge*

Number of needle pitches in 25·4 mm of bed length.

4 SHAPE, CONSTRUCTION AND DIMENSIONS

4.1 The knitting machine shall be so constructed as to let the carriage with cams traverse on right and left on the needle bed and individually move the needles of the machine in and out for knitting fabric/garment in flat width with selvedges. The shape and construction of the machine shall be as agreed to between the buyer and the seller. Figure 1 represents popular shape and construction of the knitting machine.

4.2 The needle bed shall be made out of spring steel (*see* IS 2507 : 1975) or stainless steel sheet (*see* IS 6911 : 1972). The thickness of the sheet shall not be less than 1·2 mm (18 gauge).

NOTE — Mild steel with hard chrome plating (*see* IS 1337 : 1980) of 1·6 mm (16 gauge) may also be used.

4.3 Number of Knitting Needles

The number of knitting needles in a machine of 90 cm working width shall be 200 (*see* Fig. 2).

4.4 Slit Pitch of Needle Bed

The slit pitch of the needle bed shall be 4·5 mm subject to a tolerance of ± 0·05 mm. However, total deviation between 20 pitches i.e. 21 consecutive slits shall not be more than ± 0·1 mm.

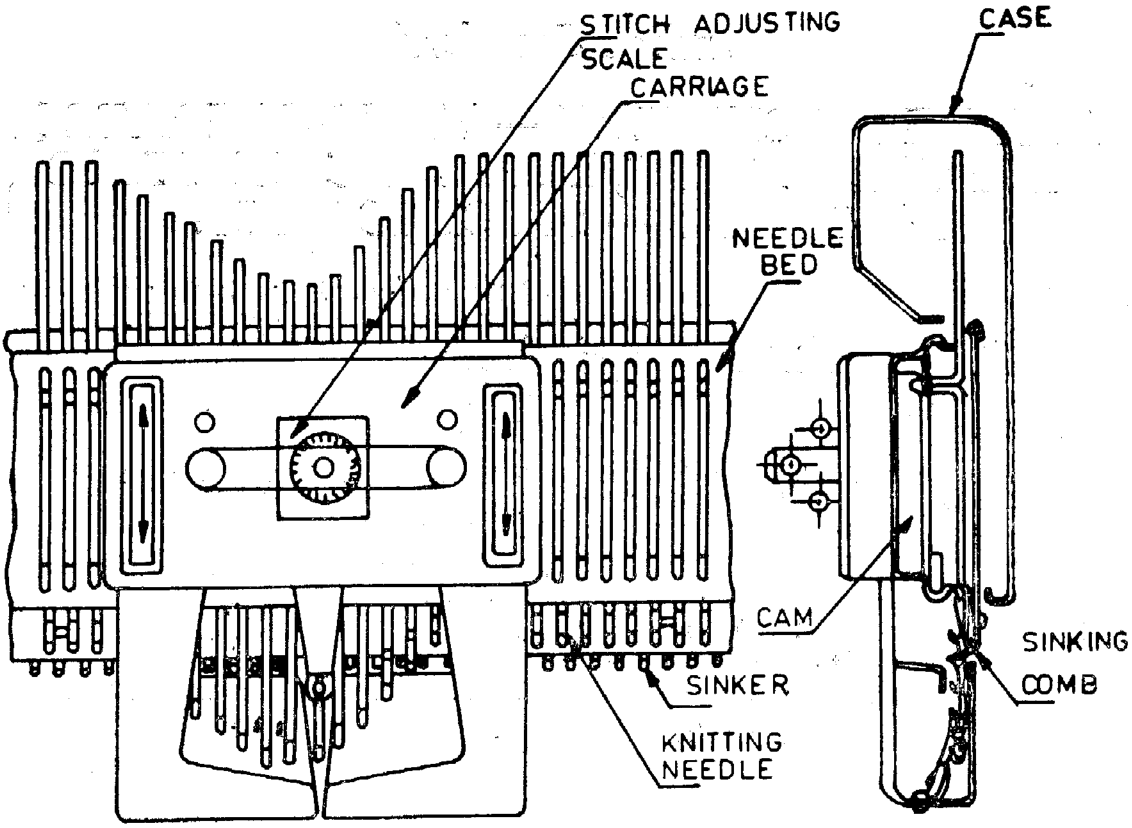

FIG. 1 TYPICAL HAND-OPERATED KNITTING MACHINE

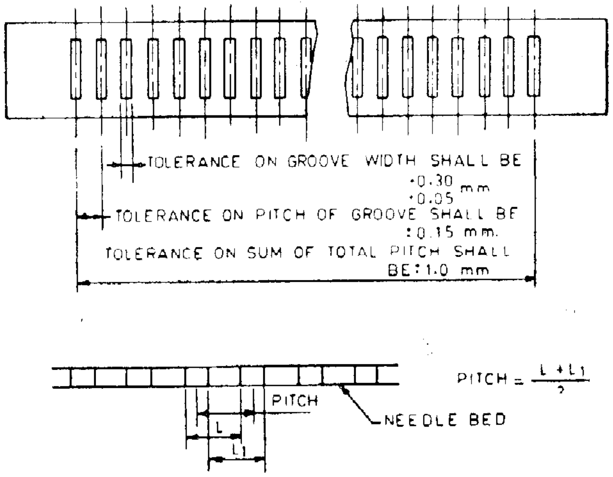
TOLERANCE ON GROOVE WIDTH SHALL BE +0.30 +0.05 mm
TOLERANCE ON PITCH OF GROOVE SHALL BE ±0.15 mm.
TOLERANCE ON SUM OF TOTAL PITCH SHALL BE ±1.0 mm
PITCH = (L + L1)/2
PITCH
L
L1
NEEDLE BED

FIG. 2 NUMBER OF KNITTING NEEDLES

4.4.1 The width of groove of the needle bed shall be 1·4 ± 0·05 mm.

4.5 Base of Needle Bed

The length of base of needle bed shall not be less than 100 cm.

4.6 Stitch Adjustment Control

Ten step stitch tension control for selecting tension to suit yarns of different weight and count shall be provided. The capacity of the scale of stitch tension control shall be as given in Table 1.

Table 1 Capacity of Scale of Stitch Tension Control

Graduation	Stitch Class	
1, 2, 3	Fine yarn	(2/18 worsted)
3, 4, 5, 6	Medium Fine yarn	(3/18 worsted)
6, 7, 8, 9, 10	Ordinary/Coarse yarn	(4/18 worsted)

4.7 Type of Knitting Needles

The latch needles shall be used.

4.8 Row Counter

If agreed by the buyer, the machine may also be supplied with a row counter.

5 APPARATUS AND FINISH

5.1 All surfaces of the machine shall be well finished and free from injurious flaws, cracks, rust, burns, stains, unevenness and other painting and polishing defects.

5.2 Bed and other parts made of spring steel or mild steel shall be plated with nickel and chromium to prevent rusting. The thickness of plating shall not be less than 0·015 mm (15 micron) when tested in accordance with the method prescribed in IS 3203 : 1982.

6 ACCURACY OF ASSEMBLY OF SINKERS

The alignment of sinkers shall be parallel to needle bed and the needles shall move/work in the centre of sinkers. The distance from depth plan of carriage operation to stitch forming plan of sinkers shall be uniform throughout. However, the difference in measurement, if any, shall be within 0·25 mm when measured at three adjacent places of bed and within 0·5 mm when measured at ends or at two different places at different length.

7 HARDNESS AND CASE DEPTH

7.1 The hardness of various parts shall be as given below:

Name of Part	*Hardness*
Stitch Cam	55-58 HRC
Holding Cam	47-52 HRC
Tuck Cam	30-35 HRC
Centre Cam	38-40 HRC

7.2 The case depth in case of holding cam shall not be less than 0·2 mm.

8 DEFLECTION

8.1 Top and Bottom Deflection of Needle Bed

Top and bottom deflection of needle bed relative to its total length shall be within 1·0 mm as shown in Fig. 3.

8.2 Longitudinal Deflection of Operating Basic Surface of Carriage

The longitudinal deflection of operating basic surface of carriage of needle bed or rail shall be within 0·8 mm relative to total length of needle bed or rail shown in Fig. 4.

8.3 Clearance Between Carriage and Operating Basic Surface

The clearance between the carriage operating basic surface of needle bed and longitudinal direction of the carriage shall be within 0·8 mm.

9 STRENGTH OF NEEDLE BED

The strength of needle bed when applying a load of 49 N (5 kgf) for one minute upon a 14 mm radial steel ball put in the centre of crest in the middle part of needle bed shall not have a permanent deformation exceeding 0·1 mm.

10 CARRIAGE LOCKING DEVICE

A suitable carriage locking device for removal of carriage from needle bed, in case the needles get stuck, shall be provided.

11 PERFORMANCE

11.1 Operation

For the operation, the needle range of 50 cm, by making dial 5 as a basis using worsted yarn of 100 percent wool corresponding to each pitch, when plain stitch operation is carried out with speed of each stage per 2 s. The motion of carriage shall be smooth, the resistance shall be little and free from abnormal noise and the knitting load shall not be more than 49 N (5 kgf).

11.2 Stitch

The stitch tension shall be uniform and the stitch shall be inconspicuous in course stripes and sinker line, and free from missed stitches and thread breakage.

11.3 The sinker lines shall not be remarkably perceptible to the naked eye.

11.4 The stitch drop shall not be present.

11.5 The selvedge of the fabric shall be well secured.

11.6 The knitting shall be free from other defects such as tuck stitch; held stitch and width deviation.

12 MARKING

12.1 The needle bed shall be marked/numbered as 0 to 100 on both sides after 10 needles to facilitate the counting of needles required to be put in action for knitting of different widths. Alternatively, the marking may also be made on a number strip positioned on the front bed.

12.2 Indication of the source of manufacture shall be marked on the metallic box and bed of machine.

12.3 The knitting machine may also be marked with the Standard Mark.

13 PACKING

13.1 Each machine may be provided with a tool box containing accessories as given in Annex B.

13.2 The knitting machine shall be suitably packed so as to ensure complete protection from rust and damage during transport. A recommended method for seaworthy packaging of knitting machine is given in Annex C.

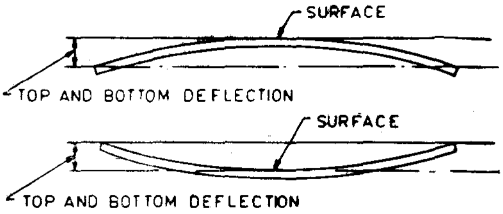

FIG. 3 TOP AND BOTTOM DEFLECTION OF NEEDLE BED

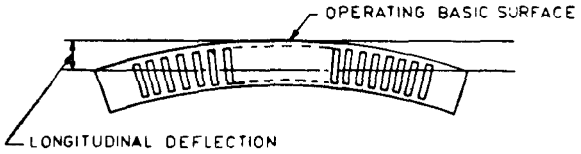

FIG. 4 LONGITUDINAL DEFLECTION OF OPERATING BASIC SURFACE

ANNEX A

(*Clause* 2)

LIST OF REFERRED INDIAN STANDARDS

IS No.	*Title*
1029 : 1970	Hot-rolled steel strip (baling) (*first revision*)
1337 : 1980	Electroplated coatings of hard chromium on iron and steel (*second revision*)
1397 : 1990	Kraft paper (*second revision*)
1398 : 1982	Packing paper, water-proof, bitumen laminated (*second revision*)
1503 : 1988	Wooden packing cases (*third revision*)
2507 : 1975	Cold-rolled steel strips for springs (*first revision*)
2508 : 1984	Low density polyethylene films (*second revision*)
3203 : 1982	Methods for testing local thickness of electroplated coatings (*first revision*)
6911 : 1972	Stainless steel plate, sheet and strip

ANNEX B

(*Clause* 13.1)

TOOL BOX

Sl No.	Name	Type of Knitting Machine					
		Manual		Semiautomatic		Cardomatic	
		Qty.	Type	Qty.	Type	Qty.	Type
1.	Fastener clamps	2	Inclined	2	Inclined	2	Flat
2.	Transfer needles	3	1 : 2 2 : 3 preferred 3 : 4	3	1 : 2 2 : 3 preferred 3 : 4	3	1 : 2 2 : 3 preferred 3 : 4
3.	Pattern plates	6	Metal type	2	Metal type	2	Metal type
4.	Tarpet	1	—	1	—	1	—
5.	Spare latch needles	3	—	3	—	3	—
6.	Weights	2	Total wt. of 2 should not be more than 250 g	2	Total wt. of 2 should not be more than 250g	2	Total wt. of 2 should not be more than 250g
7.	Screw driver	1	Either plain or 'Philips' head	1	Either plain or 'Philips' head	1	Either plain or 'Philips' head
8.	Measuring tape	1	—	1	—	1	—
9.	Oil can	1	—	1	—	1	—
10.	Carriage instner	1	—	1	—	1	—
11.	Garment holders	2	Sheet type 1 big suitable for 130 and 1 small suitable for 70 needles	2	Sinker type suitable for 100 × 200 needles	2	Sinker type suitable for 200 needles
12.	Set lever handle	—	—	1	—	—	—
13.	Row counter	1	Optional	1	—	1	—
14.	Cost on thread	1	—	1	—	1	—
15.	Push cards	—	—	—	—	20	—
16.	Card snappers	—	—	—	—	4	—
17.	Pont cans	—	—	—	—	2 sets	—
18.	Magic cans	—	—	—	—	1 set	—
19.	Machine brush	1	—	1	—	1	—
20.	Thread separaters	—	—	—	—	2 sets	—
21.	Instructional manual	1	—	1	—	1	—
22.	Boarder rods	2	—	2	—	2	—
23.	Side weights or small comb weight	2	—	2	—	2	—

ANNEX C

(*Clause* 13.2)

RECOMMENDED SEAWORTHY PACKING OF KNITTING MACHINE

C-1 Oil the surface of needle bed with good quality of lubricating (spindle) oil and place one layer of kraft paper (*see* grade 2 of IS 1397 : 1990) equal in width and length of bed and one layer of polyethylene film of 60 micron thickness (*see* IS 2508 : 1984) or wax paper or water proof paper (*see* Type 1 of IS 1398 : 1982).

C-2 Remove (unscrew) the 'handle' and the 'arm' from the carriage and set the carriage on one (left) side of the bed and fix/screw in tight with the needle bed with the help of carriage lock to prevent its movement on the bed during transport. Stuff a piece of thermocol pad between the carriage and the case of machine.

C-3 Pack the handle and arm of carriage and all other accessories (except garment holders and border rods) in the tool box. Place one layer of kraft paper and one layer of polyethylene film over the accessories, handle and arm and close the lid of the tool box. Wrap the tool box with one layer of polyethylene film and one layer of kraft paper giving 10 cm overlapping. Fasten the tool box at places with 10 mm wide cotton tape. Pack the tool box in the other (right) side of bed. Fix it tight with the needles bed with the help of lock provided in the tool box. Stuff a flat piece of thermocol in empty place between the tool box and the case of machine. Stuff another piece of thermocol between the remaining part of bed and upper cover of the machine. Fit the cover and close the machine. Lock the cover with the locks provided at the back of the base of machine.

C-4 Wrap the packed machine with two layers of kraft paper with overlapping of 10 cm and seal with plastic tape. Put the machine in a polyethylene envelope of suitable size. Pack the garment holders and border rods first in an envelope and then fasten it to the machine at the side near the handle of the machine. Put the machine with its handle upward in a 5 ply corrugated cardboard box with pieces of thermocol or dry straw. Put the cardboard box in a polyethylene envelope. Seal the envelope with waterproof sealing tape. Fasten the cardboard box with cotton tape at 3 places.

C-5 Pack another machine in a similar manner and put the second machine over the first one. Put both the boxes in another corrugated cardboard box of bigger size and stuff the empty space with suitable packing material such as thermocol, clean dry straw or dry paper cuttings. Close the big cardboard box and seal with water proof plastic sealing tape.

C-6 Put the packed box in a wooden case (*see* IS 1503 : 1988) of suitable size. Stuff the empty space with clean and dry packing material. Nail the lid of the wooden case and all joints properly. Bind the case with 0·7 mm thick and 16 mm wide new hard grade flat steel strips (or hoops) (IS 1029 : 1970) at least at four places parallel to the battens.

C-7 The wooden case shall be marked with indelible ink with the following:

a) Name of the machine;

b) Quality;

c) Gross weight;

d) Net weight;

e) Indication of the source of manufacture;

f) Month and year of packing; and

g) Any other information required by the buyer or law in force.

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Printed at Paragon Enterprises, Delhi, India